Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

8
6 Fm
2

COTTON IN AUSTRALIA

U. S. DEPT. OF AGRICULTURE
NATIONAL AGRICULTURAL LIBRARY
JAN 13 1967
CURRENT SERIAL RECORDS

FAS M–181 DECEMBER 1966
U.S. DEPARTMENT OF AGRICULTURE FOREIGN AGRICULTURAL SERVICE

FOREWORD

For a number of years Australia has imported most of the cotton its small but important cotton textile industry has consumed. The cotton people in the United States have followed with interest the developments taking place in Australia. This has been especially true of the spectacular expansion in raw cotton production that has taken place in recent years and the shrinking of Australia's raw cotton import requirements.

This is one of a continuing series of reports in which recent developments in cotton in some parts of the world are presented and an attempt made to understand the forces that will affect developments in the years ahead. Such reports are designed to help those U.S. businessmen and public officials who are interested in U.S. cotton and export markets to understand the forces that are at work in the world today and their significance so far as exports of U.S. cotton are concerned.

The author wishes to express his appreciation to the many persons who contributed so generously to this study. The list of those to whom he is indebted includes key officials in various Australian business firms, numerous farmers and State and Commonwealth officials with whom the author conferred and traveled. He is also indebted to numerous colleagues in the U.S. government, in Australia and in Washington, for their numerous and worthwhile contributions.

R. C. Sherman
Director, Cotton Division

CONTENTS

Page
The raw cotton industry: ---------- 1
    History ---------- 1
    Areas of production ---------- 2
    Role of water ---------- 5
    Scale of operation ---------- 5
    Production practices ---------- 8
    Varieties ---------- 9
    Insect and disease control ---------- 10
    Alternative crops ---------- 11
    Government policy ---------- 11
    Production prospects ---------- 12
Cotton textile industry ---------- 13
Foreign trade in cotton ---------- 13

COTTON IN AUSTRALIA

HORACE G. PORTER
Cotton Division

In only a few years' time, a comparatively few farmers have made more solid progress in Australian cotton production than had been made in the previous century. Stimulation has come from very high returns per pound as a result of an attractive price, a high bounty payment, use of irrigation water, and an example of cotton successfully produced by irrigated farming with complete mechanization. At first, a few Americans who had successfully grown cotton in the Western United States had the confidence to start mechanized, irrigated cotton farming in Australia, and show the way with high-cost, high-return ventures. They were quickly joined, and are still being joined, by Australians and additional American families.

Today no one doubts that high-yielding and high-quality cotton can be grown in Australia. The concern now is with the question: "Can cotton production be made efficient enough to be profitable, if and when the bounty system no longer exists, and if and when it becomes necessary to export sizable quantities of cotton?" Final answers may not be available for years to come. However, the degree of success to date, and the nature of the growers' problems along with the success in overcoming them, have generated a high degree of optimism on the part of many Australians. These feel that the country is well on its way to becoming largely self-sufficient in raw cotton production and perhaps even a net exporter.

Already, Australia's domestic production has changed the composition of its raw cotton imports. Only a few years ago, production of spinnable grades was so low that the mills expected imports to cover virtually all of their raw cotton needs. The mill industry is expected to take all of the usable qualities of the total domestic crop in order to gain a remission of duty on quantities imported. The incentive to obtain duty-free imports is relatively less now than formerly, when practically all cotton was imported, mills will probably continue to cooperate with Australian cotton producers by buying all usable grades of the domestic crop. More and more, the mills find themselves thinking of imports as supplying the residual qualities and quantities not found in their domestic crop.

All of the newer cotton-producing zones in Australia still have a sizable growth potential. Consequently, it is expected that farmers able to achieve comparatively favorable yields will tend to expand cotton acreage until they reach the practical limit of land or of irrigation water or else fully utilize their available labor supply. Assuming the continuation of the bounty system in much its present form for a second 5-year period, cotton production could continue to expand and might equal total consumption well before the end of the second 5 years, despite the scaling down of the bounty payment per pound as production rises and the limited funds become spread over a larger crop. This assumption tends to presuppose that the local crop would include more of some qualities than are needed, while at the same time remaining short of certain other qualities. It is hoped that Australia will follow a liberal trade policy when such a time arises, lest the mills be forced to use qualities of cotton that are ill-suited to their needs and thus be encouraged to turn increasingly to manmade fibers.

THE RAW COTTON INDUSTRY

History

Cotton has had its ups-and-downs in Australia. Production on a significant scale seems to have first started because of shortages during the American Civil War, then dropped back to unimportant levels as sizable U.S. exports were resumed and prices returned to normal levels. Australian production expanded again—in much the same way—during World Wars I and II but fell back to previous unimpressive levels in the following years.

Over the past generation, typical farming patterns involving cotton made it a crop of minor importance. Either it was grown as a pioneer cash crop to clear the way for dairying, or it was used as a supplementary enterprise on Queensland farms—especially dairy—as a rotation crop in the renovation of worn-out pastures and to supplement income from the major enterprises. Cotton was produced under raingrown conditions, typically on less than 10 acres per farm, although more extensive plantings also occurred. Usually, the cotton was accorded secondary consideration, and frequently it failed to get the attention that it needed. As a consequence, typical yields and incomes were low and—except in unusual periods—general interest in the crop was negligible.

Government assistance in one form or another has always played an important role in the Australian cotton industry. Before 1927, responsibility for programs rested with the states, but in that year the Commonwealth Government accepted responsibility for certain assistance. Bounty programs of one form or another have been in effect in many years since that time, and in a number of years the bounty payment contributed a significant share of gross returns to producers from the sale of their cotton crop.

Areas of production

Queensland.—Before irrigation was applied to cotton raising, most acreage—and production—was identified with Queensland. Cotton has been raised as a raingrown crop in a number of different parts of that state. By far the most important producing zone there is the Dawson-Callide area, including the valleys of the Dawson, Callide, Dee, and Don Rivers and adjacent areas. In 1962, this accounted for about two-thirds of Queensland acreage. Next in importance was the Western (Darling) Downs area, with about one-half of the remaining acreage. Making up the rest of the acreage, for the most part, are the Central and Upper Burnett, Rockhampton Coastal, Bundaberg Coastal, Lower Burnett, and the St. George Irrigation areas.

Virtually all of the raingrown cotton in Australia has come from Queensland; now, however, there is declining interest in cotton as a raingrown crop with the increasing interest in it as an irrigated crop in that state. As long as the bounty program guaranteed all growers, regardless of where their farms were located, a minimum price for seed cotton at the nearest railway shipping point, there was a distinct tendency for small acreages of cotton to be widely scattered. The 1963 Bounty Program did much to remove this built-in transportation subsidy so that the farmer's location in relation to gins and mills became important. The present program will tend to discourage production of cotton at locations far removed from Rockhampton and Brisbane, where the gins are at present located, except insofar as gins may be established within a reasonable distance.

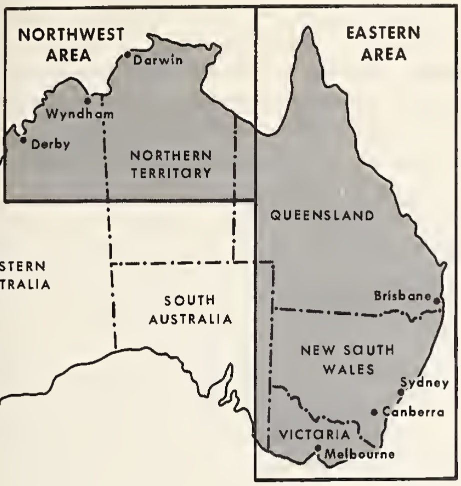
Although Queensland was the traditional cotton producing area of Australia, key people in other states also entertained hopes that cotton might contribute to future agricultural development in their respective areas. Toward this end, various governments undertook investigations to give potential cotton farmers substantial information upon which to make their initial decisions, and also farmers who had already started growing cotton, tentative research findings to guide their production practices. For example, when the first prospective cotton growers visited the Namoi River valley

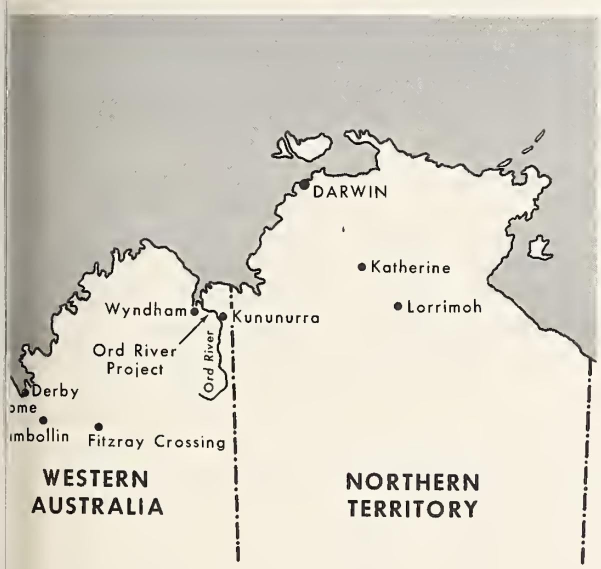
TABLE 1.—COTTON: Acreage and production in Australia, by state, crop years 1962-63 to 1965-66

Crop year	Queensland			New South Wales		Western Australia	Total, Australia
	Raingrown	Irrigated	Total	Namoi	Murrumbidgee-Murray (MIA)	Ord	
ACREAGE (Harvested)							
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*
1962-63	23.7	2.5	26.2	1.1	1.4	0.2	28.9
1963-64	9.3	2.7	12.0	5.1	1.7	1.6	20.4
1964-65	8.0	4.5	12.5	16.3	2.8	5.5	37.1
1965-66 [1]	(2)	(2)	14.7	28.4	3.5	8.4	55.0
PRODUCTION							
	Bales [3]	*Bales* [3]	*Bales* [3]	*Bales* [3]	*Bales* [3]	*Bales* [3]	*Bales* [3]
1962-63	(2)	(2)	5,642	1,300	796	173	7,911
1963-64	(2)	(2)	4,477	4,620	762	1,422	11,281
1964-65	(2)	(2)	7,421	28,750	1,698	6,672	44,541
1965-66 [1]	(2)	(2)	8,200	68,000	2,500	12,000	90,700

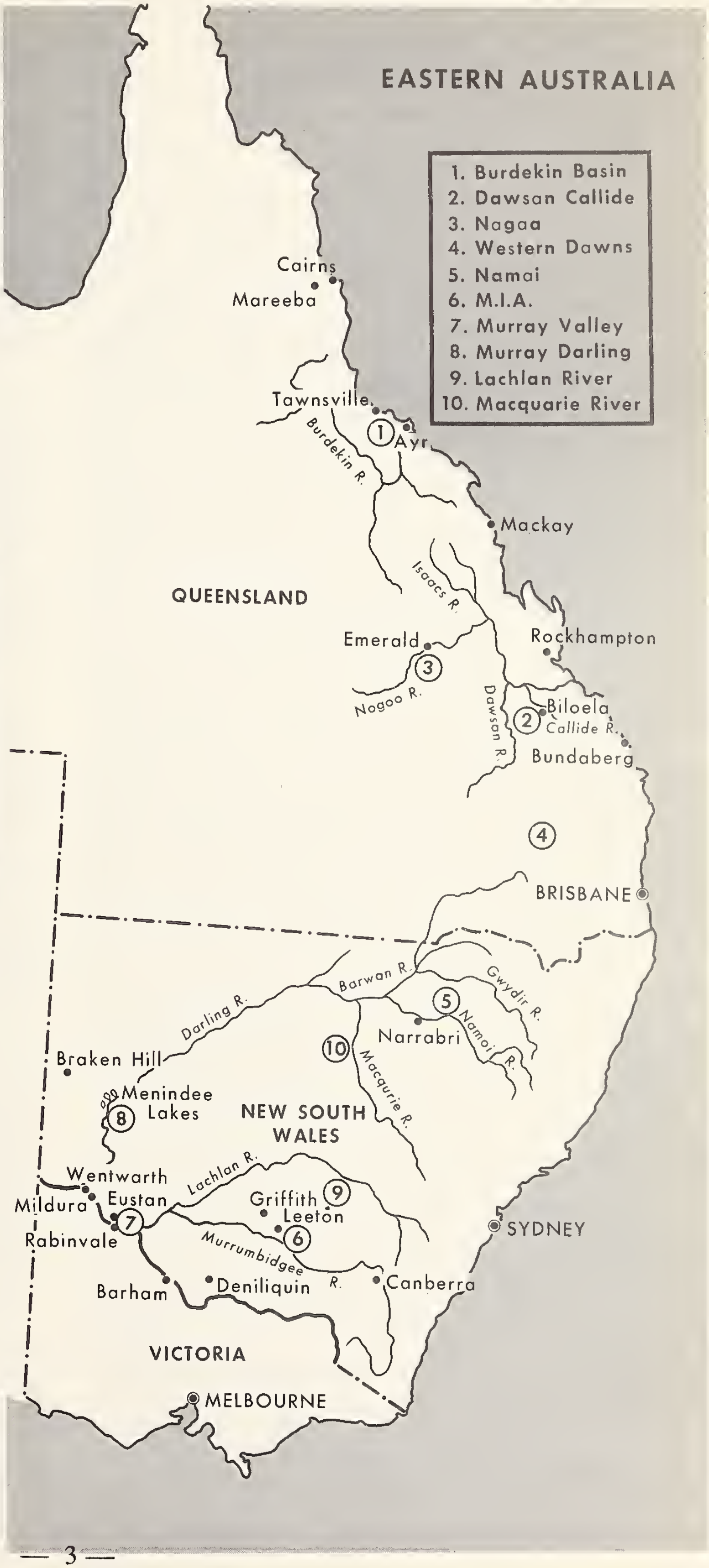
[1] Preliminary. [2] Data not available. [3] Presumably bales of 500 lb. net weight.

Source: Commonwealth Scientific and Industrial Research Organization, Division of Land Research, Australia.





COTTON GROWING AREAS OF AUSTRALIA



in New South Wales, they found worthwhile guidance from the cotton research and experimental work, already in progress for several years at the local agricultural experiment station. This same availability of test and experimental results, on various aspects of cotton production, helped stimulate initial interest on the part of still other farmers.

Perhaps the most far-reaching change in Australian cotton production was the shift from thinking of cotton as a low-capital-intensive raingrown crop to thinking of it as high-capital-intensive irrigated crop. Introduction of irrigation has made it possible to produce cotton over a far greater range of areas than was formerly considered feasible. At the same time—because of the increased cost involved—irrigation also has helped to impress upon farmers the importance of giving cotton production the care required to produce it satisfactorily.

New South Wales.—Interest in cotton production in the southeastern parts of Australia has varied in intensity over the past century, but never resulted until recently in cotton's gaining a permanent hold there as in Queensland. From the middle 1950's, this interest manifested itself in numerous trials commenced by the N.S.W. Department of Agriculture, the Commonwealth Scientific and Industrial Research Organization (C.S.I.R.O.), and farmers themselves in many localities where irrigation water was available. In the last few years, such experimental work has been concentrated largely at the N.S.W. Department of Agriculture's Narrabri Research Station in the Namoi area, at its Research Station at Yanco, and at the C.S.I.R.O. Irrigation Laboratory at Griffith in the Murrumbidgee Irrigation Area (M.I.A.). These three research centers are suitably located to provide information needed for both established areas and possible future cotton areas in southeastern Australia.

At present, cotton production is firmly established in the Namoi area and perhaps less firmly in the M.I.A., while it has been produced on limited acreages on the Lachlan and Murray Rivers. As soon as water from the newly completed Burrandong Dam is available, cotton production may be started on the Macquarie River.

The most dramatic development in Australian cotton took place in the Namoi area, where in only a few years production climbed to a substantial share of the national total. Circumstances coincided to trigger the present interest on the Namoi River in the Narrabri-Wee Waa area. The Keepit Dam on the Namoi, completed in 1959, provided adequate water for a considerable irrigated acreage. The natural conditions of soil and climate were believed favorable, and experimental work with cotton at the Narrabri Research Station appeared to confirm suitability of the area for cotton raising as well as to indicate how cotton should be handled for best results.

Two important human ingredients for launching the irrigated cotton development were available: First, interested would-be investors who knew cotton farming in their home area and who had confidence that they could succeed in the Namoi area; second, local business leaders who recognized various elements that were essential to establishing a successful irrigated farming area and provided the appropriate leadership.

The first farmers to grow cotton commercially in the Namoi River, or Narrabri-Wee Waa, area were from the United States. Their capital-intensive system of producing irrigated cotton in Australia under complete mechanization attracted farmers on both sides of the Pacific Ocean. Thus, after a very small but spectacular beginning in 1961-62, additional farmers migrated to the area and some local landowners became interested in cotton. The harvested cotton area, which totaled about 1,100 acres in 1962-63, expanded to about 5,100 in 1963-1964, about 16,300 acres in 1964-65, and 28,400 acres in 1965-66. It has been estimated that present water storage capacity is adequate for an annual crop up to 35,000 to 40,000 acres of cotton, but it should be noted that water problems developed in 1965-66 when the acreage was less than 30,000 acres. In fact, available water in the reservoir at the beginning of the 1966-67 season was only a few percent of normal.

Clearly the area has had its growing pains, but the probability is that natural calamities such as floods in the second and third years of this period will occur only rarely. Also, indications are that deficient water supplies such as are in prospect for 1966-67 are unlikely to occur in the vast majority of years. Farmers believe that they are gaining the kinds of experience that will enable them to produce cotton successfully in most future years. The business communities of Narrabri and Wee Waa also face the future with confidence that cotton is well established as a dependable addition to their local economy.

Irrigated farming has been well-established for many years in the irrigation complex known generally as the Murrumbidgee Irrigation Area (M.I.A.). Already, this irrigated area is large by Australian standards, and with associated developments it promises to become much larger, as additional irrigation water from the Murrumbidgee and Murray Rivers becomes available with completion of later phases of the Snowy Mountain Scheme and the Blowering and Chowilla Dams.

Present indications are that neither the fruit growers—whose farms are generally small—nor the rice farmers in the M.I.A., who already have a fairly profitable cash crop, will show much interest in cotton production. Main interest in cotton has been on the larger farms that are basically livestock operations and that now have access to irrigation water, where farmers are effectively discouraged either by soil characteristics or by regulation from fruit production or rice growing on a continuous basis. Some farms are at present producing rice subject to a time limitation on the number of years they can grow the crop. Should this be extended, the farms would normally be expected to continue with rice; otherwise, the farmers would turn to other products and cotton would presumably be one considered. Although enthusiasm for cotton is high among some individuals, others fear that environmental factors—especially of temperature—may make the area marginal for cotton unless quicker maturing varieties are developed. Rain at harvest time, and consequent lowering of grades, are also recognized as potential problems. Examination is underway of the feasibility of this area's shifting to earlier maturing, though shorter stapled, varieties that might be stripper-picked, much as in the Lubbock area of Texas.

Western Australia.—Those interested in Western Australia's agricultural development have, like their counterparts in the other states, always confronted severe problems of moisture availability. The northern part of the state does differ from other sections in that rainfall is heavier and monsoonal. Mean annual rainfall at the Kimberley Research Station is about 29 inches, but almost all rain falls between early December and mid-March. Historically, this short rainfall period has proven inadequate for the support of commercial crop production under rainfall conditions.

For years, however, there have been dreams of a time when dams might be built on the main rivers in the Kimberley Mountains to hold back much of their seasonal flood for use during the dry months. With such a goal recognized as a possibility, the Kimberley Research Station was established beside the Ord River in 1945 and experimental work with cotton was started in 1947.

Commercial cotton production on the Ord began in 1963-64. By 1965-66, production there exceeded that of Queensland, so the Ord area has already become the second most important cotton producer in Australia.

Further development is possible with the water now available for irrigation from the diversion dam on the Ord estimated as adequate for 30,000 acres; nevertheless, some observers doubt that cotton will occupy over one-half of this acreage at any given time. However, construction of a big storage dam on the Ord is under consideration. If built, it would enlarge the irrigation potential of the area to some 170,000 acres.

Role of water

Any agricultural history of Australia contains references to the dominating role of the availability of moisture and changes in such availability. Vast areas are characteristically too dry to support any economy other than a grazing one; still others are thought best devoted to extensive small grain production. Only a comparatively small percentage of available land is considered suitable for row crop agriculture, but even a small percentage of a country as large as Australia involves fairly large absolute acreages.

Variations in rainfall are also of great importance. The more successful livestock farmers in any area, through time, tend to be those sufficiently conservative to provide adequate dry feed or silage and water storage to last through the locality's longer drought periods. However, there are others willing to gamble a farming system's general safety on the chance at a higher income by pursuing a stocking level materially too high for drought periods, or by planting areas where more conservative farmers rely upon livestock.

Under raingrown conditions, cotton has tended to be such a "long-chance" operation, that most of the time broke even or showed a loss, but occasionally paid well. Irrigation, on the other hand, now gives promise of enabling Australian farmers to overcome problems of erratic or inadequate moisture in cotton production. However, farmers have yet to learn numerous lessons on how best to use irrigation water and how best to raise cotton under intensive irrigated conditions. Many of these can come only through experience and experimentation over a period of years.

Just as irrigation has been basic to the extension of cotton acreage in Australia, so the future history of the industry is likely to be linked with irrigation developments. In a country where the economic well-being of so many people is directly tied to amount and dependability of rainfall, ways of harnessing available water resources would be expected to receive considerable attention. Such certainly is the case in present and potential cotton areas of Australia. Analyses of the potential for cotton production in Australia invariably involve locations of water for present or potential irrigation, while general development plans include references to the priorities believed to exist for various dams and irrigation projects.

There seems, therefore, no doubt that additional dams will be built, irrigation areas enlarged or developed, and cotton considered among crops for possible inclusion in a number of the newly irrigated areas. On the other hand, there is a limit to the development load that a population base of about 12 million people can support, and this has to be spread over other developments as well as dams and irrigation projects. Nevertheless, the direction of progress is fairly clear.

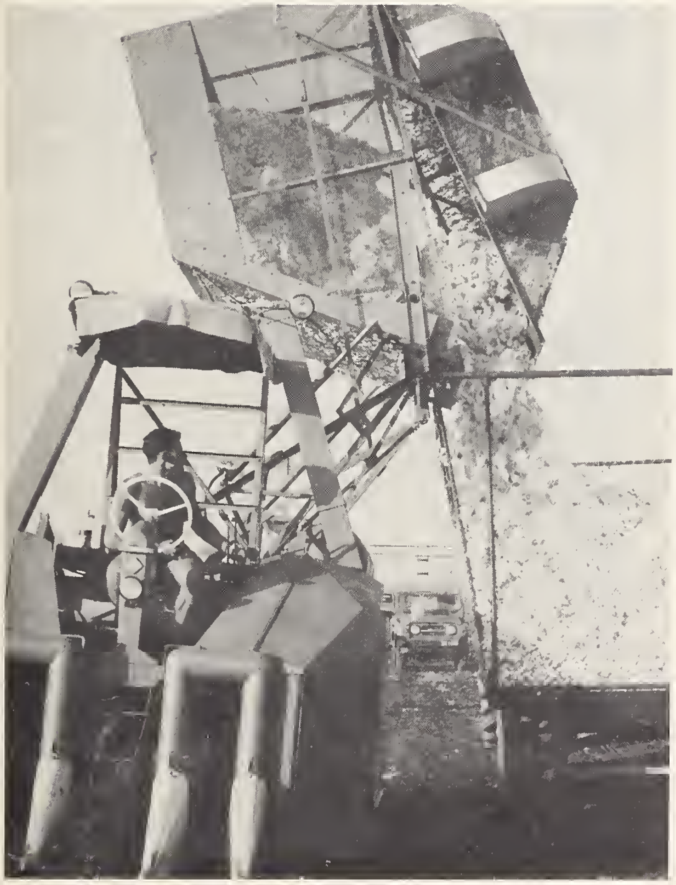
Scale of operation

Traditionally, cotton when grown under raingrown conditions in Queensland tended to serve either in the pioneer or the supplemental role mentioned, frequently occupying a place on dairy farms. During the period 1943-53, the average cotton planting per farm ranged

COTTON IN AUSTRALIA

Australia has shifted in recent years from small-scale rain-grown cotton production to large-scale and completely mechanized irrigated operations, concentrated in a few areas. Effective insect control is recognized as important and the latest techniques of spraying with ground and aerial equipment are employed for this purpose. All cotton in the irrigated areas is machine-picked and all gins in the new producing areas are modern in all respects. (The author is indebted to the Department of Agriculture of Western Australia, the Commonwealth Scientific and Industrial Research Organization, and the West Australian Newspapers Limited for use of some of the photographs.)

320



from 6 to 13 acres, amounting to only a fraction of the large farm's area. Developments of the past few years have added an entirely new dimension to cotton production, with single-enterprise cotton farms comparatively more important. Although there are still farmers who have added cotton as a supplement to existing farming and/or grazing programs, generally those raising cotton under irrigation are making this enterprise the major responsibility of at least one man and in general, also, that man is equipped with at least the minimum amount of machinery for effective farm operation. In some sections, insecticides are applied on a custom basis so that the individual farmer may not own spraying equipment.

In some areas, the acreage of cotton per full-time man or per farm, (the two are often synonymous) ranges from 150 to 200 acres, or is moving toward this range. Often, this is considered a highly desirable relationship. However, depending on circumstances, the acreage per man might rise even higher in the future. Most farmers have found that amounts of initial work and cost involved in leveling land, installing irrigation canals and drainage ditches, and buying machinery are such that they cannot develop all of their intended cotton acreage in the same year. Also, they recognize the importance of gaining some experience with the crop before trying to reach full stride. Another factor with a steadying effect on cotton acreage is the generally tight farm labor situation. Hiring regular farm workers who could successfully produce cotton under mechanized and irrigation conditions is both difficult and relatively costly; therefore, there is a tendency for farmers to count mainly upon family labor supply. It is not unusual to let an older son, not yet started in business for himself, carry the major responsibility for producing the farm's cotton.

On the Namoi River, one large corporate operation has several thousand acres already in cotton plus additional land for continued expansion if results should continue satisfactory. Except for this one very large enterprise, water rights are usually allotted on the basis of but a few hundred acres per owner; however, acquisition of land and pumping rights for each of the various family members has enabled operational units to be formed, substantially larger than the standard irrigated farm. Apparently, pumping licenses have been issued to cotton growers in this valley for over 50,000 acres.

Fairly large irrigated farms also have been developed from grain or livestock farms which have recently obtained access to irrigation water for a portion of their land. The Ord River project presents a still different situation, for these farms have generally been laid out to include 3 blocks of some 220 acres each, or a total area of some 660 acres.

The scale of operation that will eventually prevail in the various producing zones of Australia is still undetermined. The general indication is that the acreage of cotton per farm will continue to increase. The acreage per man may also increase if experience indicates that it can be done with reasonable safety. Acreage per farm may well tend to expand beyond a sustainable level and then drop back somewhat. Few, if any, of the farmers that have started irrigated cotton production in Australia under conditions of complete mechanization from 1961 to date have yet reached the limit of their land and water resources. Nor have any of a number of possible problems yet developed that might cause farmers to re-examine their current practice of planting cotton year after year on the same land. Such possible problems would include: declining soil fertility, soil structure deterioration, infestation with noxious grasses or weeds, and building up of disease organisms or insects. It seems reasonable to assume that Australian farmers will in time develop a rotation system that will cause them to produce fewer acres of irrigated cotton per 1,000 acres of irrigated land in present cotton zones than is now the case. In no sense is this intended as a criticism of the prevailing practice of relying almost entirely upon cotton. Many of the farmers have had to make sizable capital investments and it is understandable that they would wish to maximize their income by emphasizing cotton, especially in these years in which bounty payments are assured.

Production practices

Production practices today are shaped by a number of elements, among which the pioneer nature of the enterprise and the individualism of the "new" cotton farmer are very important. The class of farmers that are presently raising cotton in Australia consists for the most part of young or middle-aged men—physically vigorous and alert—who know what they are doing and why they are doing it. The pioneering spirit is strong. However, today's pioneers have more education, much more capital resources at their disposal, and far more research findings and farming know-how, on which to draw, than their counterparts in past generations. As modern-day pioneers, however, they are rugged individualists. As an example, each farmer takes it for granted that he should buy the particular make of farm machine that appeals to him, even though certain economies might be derived from having fewer makes in the community, thus simplifying repair and spare parts problems. Such rugged individualism is reflected also in the number of farm machinery and farm supply firms, among which the present limited business is divided.

Since most farmers know that they have to do virtually all the work on their cotton enterprises, they must think and act in terms of willingness to invest capital to conserve labor while at the same time striving

TABLE 2.—COTTON: Acreage, production, imports, and consumption in Australia, 1934-65

Year beginning August 1	Acreage harvested	Production	Imports	Consumption
	1,000 acres	*1,000 bales*[1]	*1,000 bales*[1]	*1,000 bales*[1]
1934	49	15	5	15
1935	62	14	9	20
1936	53	9	9	27
1937	66	10	28	30
1938	41	13	23	30
1939	41	9	38	37
1940	57	12	71	54
1941	55	10	67	62
1942	49	7	62	66
1943	16	6	44	65
1944	7	1	58	58
1945	7	2	55	50
1946	8	2	72	56
1947	7	2	71	65
1948	2	1	78	65
1949	3	1	62	70
1950	4	1	92	89
1951	5	2	88	80
1952	9	4	53	64
1953	8	3	92	90
1954	13	4	88	93
1955	11	3	81	89
1956	10	3	101	94
1957	10	3	86	93
1958	20	7	92	96
1959	37	12	87	97
1960	27	8	80	88
1961	37	10	83	94
1962	29	8	93	97
1963	20	12	116	122
1964	37	46	112	130
1965[2]	55	94	55	130

[1] 1934-45, bales of 478 pounds, net weight; 1946 to date, bales of 480 pounds, net weight. [2] Preliminary and partially estimated.

Source: Compiled from records of the Foreign Agricultural Service, publications of the Bureau of Agricultural Economics, and information from C.S.I.R.O.

for maximum feasible acreage per full-time man. Hand labor is held to a minimum or eliminated entirely, except for applying water. Extra hired labor for hoeing is scare and relatively expensive and farmers therefore hold it to a minimum. There is considerable interest in the use of pre-emergence herbicides as well as fertilizers, insecticides, and defoliants. Each of these requires careful application, but farmers believe that successful mastery of their use can lead to relatively higher profits from cotton. Farmers are also gaining valuable experience in the timing and amount of irrigation water applied and in the manner in which it is applied.

The new generation of Australian cotton farmers are especially alert businessmen, eager to succeed with the new system of farming. They are inclined to experiment with some of their own crop to see which practices give best results. They observe their neighbor's crops very closely and share results with one another. They learn also from research findings and demonstration results of local agricultural experiment stations, and from developments in other producing zones in Australia and elsewhere.

Since production conditions can range so widely over any period of several years and practices that give best results one year may not the following year, it must be expected that production patterns will continue in a state of change for some years to come, if not indefinitely. With efforts to make the good still better, through time there will continue to be net improvement in production methods.

Some observers with reservations about the length of the growing season and the weather at harvest time in the M.I.A. area of southern New South Wales think that these production conditions are rather like those in the High Plains of Texas, and may call for new methods of cotton farming. They wonder, therefore, whether their area should shift to shorter staple varieties than those grown elsewhere in Australia, that would be early-maturing and could be picked with strippers instead of the spindle-type pickers now used. This alternative is being investigated and the experience gained may then serve as a guide to future production developments in that area of new South Wales.

Varieties

For a number of years, American varieties of Upland cotton have provided the base of the Australian cotton industry; however, this does not mean that large quantities of seed are imported from the United States, since quarantine regulations preclude this. However, the small quantities received are used to propagate seeds under quarantine, and if these are approved, the experiment stations are allowed to test the variety under Australian conditions. Active breeding programs—each involving fulltime cotton breeders—are now in progress at Griffith and Narrabri, in New South Wales; at the Kimberley Research Station in Western Australia; and at Biloela in Queensland. While introduction of varieties from the United States and selection within them still predominate in these programs, these also include examination of varietal material from other sources, as well as local hybridization. Those varieties that prove sufficiently promising during the period under observation are further selected (taking all relevant characteristics into account) and are multiplied for release as commercial varieties. Thus, some of the Australian varieties are Australian-developed strains of American varieties.

In 1955, the leading commercial varieties in general use were Miller, New Mexico Acala, Lonestar, and Triumph. In addition to these commercial varieties, a number of others were tested, some originally selected for testing because of potential suitability for machine-picking.

Eleven years later—the crop harvested in 1966—the leading varieties were Deltapine Smooth Leaf, and Empire 289 in New South Wales, Rex and Deltapine 15 in the Ord River Area, Deltapine Smooth Leaf in the Central and Coastal Districts of Queensland, and Dixie King in the Southern District of Queensland. These, as well as a number of other varieties, are in various stages of testing, selection, and seed multiplication. Among the others are Rex Smooth Leaf, Auburn, and Stoneville.

Since some of the varieties grown are adversely affected by bacterial blight (angular leaf spot and boll rot) and wilt (*Fusarium* and *Verticillium*), there is a good bit of interest in finding resistant varieties to which to turn if present varieties have to be replaced. There is also interest in developing supplies of seed of promising varieties.

Insect and disease control

Damaging or potentially damaging insects have to be contended with in all cotton producing areas of Australia, but in general the problems of insect control tend to intensify as one moves from less tropical (southern) to tropical (northern) areas. Virtually all major insects injurious to cotton, except for the boll weevil, are found in Australia. Even so, effective control has been obtainable with modern equipment and insecticides but must be reckoned with as a substantial cost factor.

Cotton has not yet been grown in Australia under present conditions for a sufficiently long period to give a clear indication of relative strength of the various pests. For example, the red spider mite, present in all areas, was not a significant problem until insecticides began being used in sufficient volume to reduce the populations of its natural predators. As a consequence, the red spider mite is now recognized as occasionally serious in all cotton producing zones.

The native budworm (*Heliothis punctigera*) and the rough bollworm (*Earias huegeli*) are at present serious pests in all areas, and in the Ord area the tobacco cluster grub (*Prodenia litura*) also known as the Egyptian cotton worm, appears to be important in all years. The pink bollworm (*Pectinophora gossypiella*) is serious in some years in the Ord area and the pink spotted bollworm (*Pectinophora scutigera*) is present in Queensland but is not considered a serious pest.

Angular leaf spot, a form of bacterial blight (*Xanthomonas malvacearum*) is the most important disease affecting cotton in Australia. Other forms of bacterial blight are relatively rare. Both *Fusarium* and *Verticillium* wilts are found in New South Wales; the latter also is found in Queensland. Cotton in Queensland and on the Ord also experiences a malformation of the bolls, commonly referred to as "parrot beak". Other diseases exist, but to date they are not believed to be of economic significance.

In view of the high degree of mechanization of irrigated cotton production in Australia, it is not surprising that most insecticides are applied either by tractor-powered spray rigs or by wing aircraft, or helicopter. Reasons for a farmer's choice vary considerably from area to area and even within certain areas.

The high rainfall in the Ord area during certain parts of the growing season makes the fields so soft that farmers cannot depend upon being able to get into the fields with tractor spray rigs as needed. Consequently, airplane and helicopter spraying seems well established. In Queensland and New South Wales, on the other hand, rainfall patterns and soils are such that farmers are more likely to be able to get into the fields with tractor sprayers most of the time when spraying is needed, and it is entirely possible that tractor-mounted spray rigs will be quite commonly used. Even so, in heavy-soil areas of these states, spraying schedules with ground equipment may be interrupted by wet fields after rains or irrigation, with a corresponding weakening of the insect control program.

Looking ahead, it seems reasonable to expect cotton farmers in various parts of Australia to continue to face new and challenging problems of effective insect control. Some of these new situations will result from variations in crop season, from those thus far experienced in this very new industry. Shifts in the balance of insect populations can also confront the cotton industry with new situations.

Periods of acute insect damage, especially in limited areas, can therefore be expected, but the alertness demonstrated by farmers, professional agricultural workers, and representatives of agricultural chemical companies leads one to expect that effective insect control could be re-established in only a year or two, as with the tobacco cluster grub in the Ord River area. All farmers raising cotton under irrigated conditions recognize both the necessity of effective control, if satisfactory yields are to be obtained, and the importance of so doing as a cost factor.

The present practice of continuous cropping to cotton may need to be reviewed at some time as a factor in insect and disease control, and the extension of the growing season in the Ord area to obtain a second fruiting period also may need to be reviewed from an insect control standpoint.

The future trend with respect to disease control is more obscure. Through time one would expect many farmers to escape serious disease problems on their farms.

However, a sufficient number might experience problems for forms of remedial action to be instituted that might affect all farms in that producing zone, especially if such actions were called for as seed treatment or variety change.

Alternative crops

Many farmers have been engaged in irrigated farming in Australia only for the same length of time that they have been raising cotton. Most of the irrigated cotton is on farms that started cotton production within the past few years. In fact, no farmers in New South Wales and Western Australia who harvested cotton in early 1966 were growing cotton in Australia as long ago as 1960. For a few, this was their fifth crop, but for far more their first, second, third or fourth.

As it is quite expensive to commence irrigated farming and to buy the specialized machinery used for cotton farming, it is understandable that farmers would push their basic crop, cotton, as hard as possible in establishing it, and present conditions still favor continuation of this practice. When, however, cotton farmers bring more land under irrigation than they care to devote to cotton, other crops may enter their farming system; but for several years this seems unlikely to be common.

Through time, the need to develop a rotation around cotton might cause cotton acreage on individual farms and producing zones to decline, but a considerable further rise can occur—and will—before such topping-out. In most countries, it is fairly easy to identify crops that tend to be grown in a farming system in rotation with cotton, and often in competition with cotton, but this is less easy in Australia because both mechanized cotton production and some of the irrigated farming areas are so new.

A number of alternative forms of land use have possibilities in present and potential irrigated cotton areas but the patterns are less evident in these new irrigation areas than in those where irrigated farming has existed for a number of years. In the older irrigated areas of New South Wales, for instance, cereals perform well under dry land or irrigated conditions; rice is grown successfully, and irrigated pasture land permits intensive production of sheep and cattle. In the newer irrigated areas of all three cotton-producing states, experience will be required to learn what crops or livestock enterprises are most likely to supplement cotton production and what, if any, might compete.

In the Ord area, rice has been suggested as a possible crop but yields to date have not been sufficiently high to offer effective competition. Experience with sugarcane on the Kimberley Research Station indicates that the crop grows well there, but the industry is strongly established in Queensland and the sales outlook for additional sugar does not encourage its development in the Ord area. Some observers believe that grain crops may become part of the cropping pattern on the Ord, especially if there should be a development of livestock production in the Kimberlies; while others believe that oilseeds—flaxseed and safflower—may become a cash crop if *Prodenia* should be effectively controlled.

In Queensland, the situation is quite different from that in the other states, inasmuch as there are greater opportunities for summer crop production; also, marketing channels for the various crops exist. Cotton farmers who have just started farming under irrigated conditions will need to gain experience with behavior of the various crops under irrigation before it will be apparent which can most profitably be produced in rotation with cotton.

Government policy

For some years, the State Government of Queensland and the Commonwealth Government have actively encouraged Australian farmers to produce cotton, in order to provide an additional source of farm income, as well as to lessen import requirements for raw cotton. This assistance has taken various forms, including guaranteed prices and bounty payments, establishment and operation of the Queensland Cotton Marketing Board, and various research and extension activities.

Various government programs and policies are at present assisting in expansion of Australia's cotton acreage, although the majority were not designed primarily for cotton. These include construction of dams partly for irrigation use, and the public distribution of irrigation water and issuance of pumping rights, in a number of instances. Public land policy, also, plays an important role in opening new irrigation areas, and in the case of the Ord River area, the Government of Western Australia develops a portion of the land on each farm before it is sold to the settler. Public bodies also conduct research of both basic and applied natures and carry on extension-type activities to help farmers overcome problems associated with cotton production.

The bounty system was changed in 1963. Previously, the bounty system guaranteed all growers a minimum price for seed cotton at their nearest railroad loading point, regardless of its location. This meant that the Commonwealth absorbed the freight cost from more distant producing zones. Under the new act, the bounty is paid on the basis of cotton's being delivered to the gin at the farmer's own expense. Also, quality differentials are now more effective. In both programs there were minimum qualities to which the bounty would apply.

A change developing from the rapid increase in production is affecting the bounty rate per pound. Under the new bounty program there is a ceiling of $4 million on expenditures. Such an amount was adequate for the maintenance of the full bounty payment for the crops harvested in 1964 and 1965. However, in 1966 the crop was sufficiently large to cause a scaling-down of the bounty payment per pound to about 70 percent of the basic rate set under the Bounty Act.

TABLE 3.—Projected Australian basic[1] bounty rates related to various assumed levels of production (for domestic consumption only) with assumed $4 million ceiling on bounty fund

Level of cotton production for domestic consumption	Bounty payments				
	Total	Per bale		Per pound	
1,000 bales (480 lb. net)	*Million Australian dollars*	*Australian dollars*	*U.S. dollars*	*Australian cents*	*U.S. cents*
50	3.2	64.50	72.24	13.437	15.049
60	3.9	64.50	72.24	13.437	15.049
70	4.0	57.14	64.00	11.904	13.332
80	4.0	50.00	56.00	10.417	11.667
90	4.0	44.44	49.77	9.258	10.369
100	4.0	40.00	44.80	8.333	9.333
110	4.0	36.36	40.72	7.575	8.484
120	4.0	33.33	37.33	6.944	7.777
130	4.0	30.77	34.46	6.410	7.179

[1] In these computations the basic bounty rate of 13.437 Australian cents for Middling 1-inch cotton has been used as the average for the crop. Actually, the 1964-65 crop is estimated by the Bureau of Agriculture Economics (B.A.E.) to have averaged sufficiently above Middling 1" to have resulted in an average bounty rate of about 13.9 cents. If such a premium proves typical in future crops, the average bounty rates per bale and per pound will be lower than shown above.

Source: Adapted from material published by the Commonwealth Bureau of Agricultural Economics.

The present bounty program is applicable to the five calendar years 1964-68. Although such anticipation is admittedly hazardous, there appeared to be a widespread feeling in cotton circles in 1965 that in 1968 the bounty system would be extended for another period with the overall limitation on bounty payments of $4 million retained. It was agreed that the basic intent of the new bounty system was to try to establish a viable raw cotton industry in Australia. Many people in the industry, or close to it, believe that a good start in this direction has been made, but point out that there will still be numerous new beginning producers toward the end of the present five years, that will not yet have established themselves firmly. As a result, such observers forsee the continuation of the present program for at least another five years as well as substantial downward adjustment of the rate per pound, as the $4 million is spread over a larger crop. Thus, it is contended that the more gradual lowering of the bounty payment per pound in the coming years, if the crop continues to increase in the second 5-year period, provides the farmers a transition period so that the shock from eliminating the bounty would be less severe than if it were done at the end of the present 5-year period.

Another aspect of public policy and programs that seems likely to affect cotton production in Australia, in the years ahead, is the inter-area rivalry already becoming apparent which could, of course, intensify to the point of influencing state and Commonwealth political action. Leaders of several newer areas feel that their own should be encouraged to expand and that the costs of encouraging continued expansion in other areas should not be incurred. In some instances, these rivalries are between producing zones within the same state; in others, between zones in different states. At times, the cotton issue also gets caught up in the broader controversy over the priorities that should be established for developing various parts of the Commonwealth.

Production prospects

Although so many factors will have a bearing on Australian cotton production prospects that it is hazardous to anticipate the outcome, some attempt to look ahead may be sufficiently useful to justify the effort and the risk. In general, various factors appear likely to cause production to continue expanding at a fairly rapid rate, although admittedly more slowly than in 1964-65 and 1965-66. This does not rule out the possibility of set-backs in individual years attributable to water shortage or other factors.

The internal price—which for some time, at least, will continue to be based on the world price plus the shipping cost of bringing cotton to Australia—will be high relative to prices in most cotton producing countries. Furthermore, when this price is supplemented by the bounty payment, the gross return to the producer is especially attractive. This rate of gross return (per pound), to Australian farmers who raise cotton and who have been successful in achieving satisfactory yields in most years is a tremendous incentive to expand cotton production up to the point where some factor becomes limiting. On some farms this may be land on others irrigation water, on others labor and/or machinery. Thus, it is expected that farmers who can handle an additional, say, 50 acres of cotton with their present land, water, machinery, and manpower, will expand their cotton production as soon as practical arrangements can be made. Similarly, a farmer with plenty of land and water may, if he should have the additional labor available or in sight, buy necessary additional equipment to enlarge his cotton enterprise from, say, a one-man unit to a two-man unit.

It should be noted that on individual farms—and even in whole producing zones—cotton acreage may well expand in the next five years or so past a sustainable level. If, for any of various reasons, the farmers in a particular producing area find it necessary to develop some systematic rotation in which cotton will be but one of several uses for the land, cotton acreage may decline to a more sustainable level.

It is to be expected that the expansion within the next five years will occur largely in the present producing zones. It appears possible, however, that irrigated areas may open up along other streams in the interior portions of New South Wales and Queensland. In fact, it is reported that if rainfall in 1966 is sufficient to fill the Burrandong Dam, several thousand acres of cotton could easily be planted the following year on the Macquarie River. Also, there are reports of favorable experimental yields having been achieved at a research station on the Gascoyne River in Western Australia, but apparently no commercial production has yet started. Presumably, most other new areas would still be comparatively small by the end of such a 5-year period. Conceivably, total Australian cotton production may exceed total domestic mill consumption. Even so, the resulting crop may contain an excess of certain qualities and a deficit of others. Under such conditions, Australia would need to import qualities not sufficiently available in the domestic crop. It would be hoped that a sufficiently liberal trade policy would be followed to permit qualities in short supply to be imported.

COTTON TEXTILE INDUSTRY

The Australian cotton textile industry is vertically integrated with most of the 10 spinning firms carrying out a number of processes. The four largest firms account for about 80 percent of a total industry employment of about 10,000. Cotton consumption totaled about 122,000 bales in 1963-64, and 130,000 bales each year in 1964-65 and 1965-66. This general level compares with a range of 88,000 to 97,000 bales per year in the previous decade.

The Australian consumer has always relied largely upon imported cotton textiles, but through time an increasing share of the cotton textiles consumed is produced domestically. During 1965, it was reported by the industry that most of the knitted goods, but only about 15 percent of the broad woven goods, consumed, was produced domestically. The industry had appealed to the Australian Government for additional protection to enable domestic mills to raise their share of the market for broad woven goods to about 25 percent.

The Tariff Board's report, as approved by the government in October 1965, granted increased duties on some textile items. However, the report went further and envisaged that the textile industry should move out of certain areas of production and into new ones or expand output of some hitherto minor lines. When the government immediately implemented the recommendations, protection was granted to items which were at the time not produced and large tariff increases made on items produced in insufficient amounts. The textile industry is adapting itself to the new set of conditions. Preliminary indications are that once the industry has reorganized its operations in accordance with the Tariff Board's recommendations, output will probably stabilize at the recent level or slightly above it.

The Australian cotton textile industry already has been making some progress in developing facilities for spinning yarns with finer counts than those traditionally produced. Also, the general quality of the machinery in the Australian cotton textile industry is considered to be fairly well in line with that of the leading countries, while labor productivity also compares favorably with all but some of the lower-cost Asian countries.

FOREIGN TRADE IN COTTON

Since World War II, the cotton textile industry of Australia has made slow but generally steady progress. Until just a few years ago, there was no corresponding progress in raw cotton production in Australia, and raw cotton imports followed the same upward trend as consumption. Starting in 1964, these trends were modified and cotton production is now rising much faster than consumption while imports are declining. This new pattern seems likely to characterize the industry over the next five years.

In view of the comparatively small population of Australia, the country has rather deliberately followed the policy of allowing, and in fact encouraging, the domestic industry to produce those textiles that were needed in greatest volume and to continue to rely upon imports for specialty goods that could not be produced in small volume as efficiently as they could be imported.

This has meant that Australia's raw cotton requirements were generally for shorter staple cottons than are required for some of the textiles that are imported. With domestic cotton production moving sharply higher in 1964-65 and 1965-66, and with the effective requirement that all domestically produced cotton be consumed domestically to qualify for the bounty, the impact of recent developments upon raw cotton imports is especially significant from both quantity and quality points of view.

UNITED STATES DEPARTMENT OF AGRICULTURE
WASHINGTON, D.C. 20250

OFFICIAL BUSINESS

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF AGRICULTURE

NOTICE

If you no longer need this publication, check here ☐ return this sheet, and your name will be dropped from the mailing list.

If your address should be changed, print or type the new address on this sheet and return the whole sheet to:

Foreign Agricultural Service, Rm. 5918
U. S. Department of Agriculture
Washington 25, D. C.

TABLE 4.—COTTON: Australian imports by country of origin, 1950-65

Year beginning Aug. 1	United States	Mexico	Brazil	Pakistan	Peru	Colombia	India	Egypt	Other	Total
	1,000 bales [1]	*1,000 bales* [1]	*1,000 bales* [1]	*1,000 bales* [1]	*1,000 bales* [1]	*1,000 bales* [1]	*1,000 bales* [1]	*1,000 bales* [1]	*1,000 bales* [1]	*1,000 bales* [1]
1950	(2)	0	18	50	1	0	9	11	3	92
1951	45	0	24	7	(2)	0	2	9	1	88
1952	13	(2)	2	22	(2)	0	4	11	1	53
1953	38	0	2	34	1	0	5	11	1	92
1954	55	0	12	18	1	0	1	1	0	88
1955	33	23	(2)	20	(2)	0	3	1	1	81
1956	74	19	3	3	1	0	1	0	0	101
1957	66	16	(2)	1	1	0	1	0	1	86
1958	48	38	0	1	1	0	1	(2)	3	92
1959	60	22	(2)	1	1	0	1	0	2	87
1960	58	19	(2)	1	1	(2)	(2)	0	1	80
1961	61	14	(2)	1	2	4	(2)	0	1	83
1962	44	30	8	3	2	1	1	0	4	93
1963	84	19	6	2	2	1	(2)	0	(2)	116
1964	73	16	11	3	2	1	1	0	5	112
1965 [1]	35	14	4	2	1	1	(2)	0	8	65

[1] Bales of 480 lb., net weight. [2] Less than 500 bales.
Source: FAS Cotton Division.

For the foreseeable future, imports will be looked to as a source of the qualities of cotton not found in sufficient quantity in the domestic crop. Although this was always the case, its significance is far greater now, when domestic production accounts for well over one-half of consumption requirements, than it was when this fraction was less than 10 percent. In general, domestic production contains quite a bit of cotton that is longer in staple than is needed by the domestic industry. Of course, the mills can use such cotton, and will, but are unlikely to be willing to pay the growers as much premium for extra lengths as would customarily prevail in major importing centers. To round out their raw cotton supplies, mills will still need to import the shorter cottons that have always been imported, unless the producers in the southern part of New South Wales should shift to shorter varieties.

Regardless of the Australian farmers' possible willingness to accept a reduced premium for longer cottons than needed by the Australian textile industry, soon it may no longer be practical to try to consume all of the cotton produced in the country. In other words, Australia may be confronted with a situation in which the farmers and the country might benefit by exporting some qualities while still importing others. This might well happen quite some time before the country reaches the stage of net self-sufficiency. Should the need to export cotton arise while the bounty program is in effect, the Commonwealth Government might have occasion to consider modifying the existing program before the exportation could take place, inasmuch as no farmer could be expected under present regulations to sell cotton for export and thereby forego his claim to the bounty. Nor can a mill that buys cotton on the basis of the internal pricing system of world price plus shipping costs to Australia be expected to offer cotton for export at a price that would permit it to be shipped to other shores at the competitive world price. Yet this is the realistic basis on which Australian cotton would need to be priced if it were to enter the world market as an exporter of either small or large quantities of cotton.